Unclassified

DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1b RESTRICTIVE MARKINGS
N/A

2a SECURITY CLASSIFICATION AUTHORITY
N/A

3 DISTRIBUTION/AVAILABILITY OF REPORT
UNCLASSIFIED/UNLIMITED

2b DECLASSIFICATION DOWNGRADING SCHEDULE
N/A

4 PERFORMING ORGANIZATION REPORT NUMBER(S)
1-87

5 MONITORING ORGANIZATION REPORT NUMBER(S)

6a NAME OF PERFORMING ORGANIZATION
Bayne-Jones Army Community Hospital

6b OFFICE SYMBOL (If applicable)
HSXV-RES

7a NAME OF MONITORING ORGANIZATION
U.S. ARMY-BAYLOR UNIVERSITY GRADUATE PROGRAM IN HEALTH CARE ADMIN.

6c ADDRESS (City, State, and ZIP Code)
Fort Polk, LA 71459-6000

7b ADDRESS (City, State, and ZIP Code)
AHS
SAN ANTONIO, TEXAS 78234-6100

8a NAME OF FUNDING/SPONSORING ORGANIZATION

8b OFFICE SYMBOL (If applicable)

9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c ADDRESS (City, State, and ZIP Code)

10 SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
The determination of physician staffing mix at Bayne-Jones Army Community Hospital

12 PERSONAL AUTHOR(S)
Cote, David O.

13a. DATE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
July 17,1992	FROM 7-91 TO 7-92	920717	74

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	physician staffing, physician distribution, physician mix, physician specialties

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The purpose of this study is to determine a physician staffing mix which will meet the needs of the Bayne-Jones Army Community Hospital catchment area population following the down-sizing of Fort Polk. The active duty and dependent of active duty beneficiary populations at Fort Polk will be reduced by approximately one-third over the next two years due to Congressional mandates. As a result of this large reduction in the number of medical care beneficiaries, the number of authorized personnel at Bayne-Jones, to include physicians, will be reduced. The hospital commander must decide which medical specialties will absorb these reductions. After a projection of future patient demand and an analysis of several factors important in staffing decisionmaking, a staffing algorithm is presented to assist the commander in his decision making regarding physician staffing mix.

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION

22a NAME OF RESPONSIBLE INDIVIDUAL
David O. Cote, Major, U.S. Army

22b TELEPHONE (Include Area Code)
(318) 531-3101

22c OFFICE SYMBOL
HSXV-RES

DD Form 1473, JUN 86 Previous editions are obsolete. SECURITY CLASSIFICATION OF THIS PAGE
unclassified

THE DETERMINATION OF PHYSICIAN STAFFING MIX AT BAYNE-JONES ARMY COMMUNITY HOSPITAL

A Graduate Management Project
Submitted to the Faculty of
Baylor University
in Partial Fulfillment of the
Requirements for the Degree
of
Master of Health Administration
by
Major David O. Cote, MS
July, 1992

Accession For	
NTIS GRA&I	☑
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGMENTS

Many hours were spent on this project in the last year. Many of these hours were, with regret, spent away from my family. For their patience and understanding, I am grateful.

I am also grateful to the many people who have contributed to this project by discussing it with me and providing me with insights. In particular I thank COL William Braun, LTC Dawn L. Wells, MAJ Charles Wainright III, and LCDR Peter O'Connor for their reviews of the drafts of the project proposal and this report.

ABSTRACT

The purpose of this study is to determine a physician staffing mix which will meet the needs of the Bayne-Jones Army Community Hospital catchment area population following the downsizing of Fort Polk. The active duty and dependent of active duty beneficiary populations at Fort Polk will be reduced by approximately one-third over the next two years due to Congressional mandates. As a result of this large reduction in the number of medical care beneficiaries, the number of authorized personnel at Bayne-Jones, to include physicians, will be reduced. The hospital commander must decide which medical specialties will absorb these reductions. After a projection of future patient demand and an analysis of several factors important in staffing decisionmaking, a staffing algorithm is presented to assist the commander in his decision making regarding physician staffing mix.

Recent changes in world politics have led many countries to examine their military-industrial complex. The dissolution of the Soviet Union, the cooperation between member nations of the North Atlantic Treaty Organization and former Warsaw Pact nations, and the move of many former Warsaw Pact nations toward democracy have led the United States to question its need for the large military forces that existed during the cold war era.

Another situation that has caused the U.S. and other industrialized countries to examine their military forces is the state of their economies. In the U.S. and many other countries, the size of the national budget and the national debt have increased steadily for several successive years. The Department of Defense (DoD), accounting for over 25% of all U.S. government expenditures (U.S. Department of Commerce, 1990), has become a prime target for cost reductions.

Some of the methods Congress has proposed to reduce defense spending include reducing the number of military personnel, consolidating redundant operations within the armed forces, and closing some military installations. These actions will lead to changes in the military population at several installations

throughout the country. In turn, these population changes will impact on numerous post activities which support the soldiers and their dependents. One such activity is medical care.

STATEMENT OF THE MANAGEMENT PROBLEM

Medical resources are not simply adjustable in proportion to changes in a supported population. Large increases or decreases in a population will change the mixture of specialists necessary to meet the needs of the population. No formalized procedure exist for making such adjustments at individual military installations.

Literature Review

The number of required staff members and the mix of medical specialists at Army Medical Treatment Facilities (MTFs) have traditionally been based on work performed. Periodically, on-site manpower survey teams have examined the work output of Army hospitals and updated the Tables of Distributions and Allowances, the manpower documents for these hospitals. During the years between manpower surveys, adjustments in manpower have been made when a facility could show a change in productivity from its last manpower survey. However, the last systematic manpower survey conducted by Health

Services Command (HSC), the headquarters of fixed Army MTFs in the U.S., was in 1985.

One of the reasons for manpower surveys not being conducted since 1985 is the desire of Congress for more globally based, objectively determined staffing standards. A Congressionally established Blue Ribbon Panel which investigated the allocation of resources among the medical departments of the Army, Navy and Air Force found a lack of common standards between services on which manpower requirements were based. However, the Panel also found that much of the work the three services perform is common among them (O. Lazzeri, personal communication, April, 1992). As a result of this finding, a tri-service Joint Healthcare Management Engineering Team (JHMET) was established and tasked to develop common manpower standards on which the distribution of medical resources can be made. To date, fifty of a target 168 standards have been developed. Seventeen standards have been accepted by the Surgeons General of the three military medical departments and two more standards will be submitted for approval by the summer of 1992.

In 1990, HSC initiated an effort to determine the relationship which exist between manpower resources

utilized in its treatment facilities and facility work production (Braun, 1991). In this study, work production was measured in Medical Work Units (MWUs), a measurement that combines Inpatient Work Units (IWUs) and Ambulatory Work Units (AWUs). The IWUs for a facility are determined by multiplying the number of dispositions by the Relative Case Mix Index (RCMI) of a the facility. Ambulatory work units are determined for each service (e.g., family practice, optometry, and audiology) by multiplying the number of clinic visits to the service by a service weight. The total number of ambulatory work units for a facility is determined by summing the AWUs for each service. A linear regression analysis was conducted using the number of MWUs produced by Army hospitals as the predictor of the number of full-time equivalents (FTEs) utilized. An $R2$ of .97 was achieved, indicating that 97 percent of the variance in the number of FTEs utilized between facilities can be accounted for by facility productivity. The high correlation between FTEs and productivity also indicates that the efficiency of our manpower is consistent across facilities.

One reason for this HSC study was to develop an objective method for estimating changes in required

medical facility personnel when catchment area populations change due to Congressionally mandated base realignments and the downsizing of the Army. In its examination of hospital output, HSC calculated the mean number of MWUs generated per year by active duty soldiers and by dependents of active duty soldiers at selected posts. With these figures, a change in hospital workload (MWUs) could then be projected for a given change in the active duty and the dependent of active duty population. Using this projected change in workload and the regression equation that showed the relationship between MWUs produced and FTEs utilized, the number of FTEs required to serve a new catchment area beneficiary population could be computed.

A limitation of this methodology is the procedure by which MWUs are determined. Inpatient Work Units are calculated by multiplying the RCMI for an institution by its number of dispositions. Facilities with a large elderly census tend to have a high RCMI because of the complexity of the cases they present upon admission. However, this RCMI is applied to all categories of beneficiaries to determine the IWUs each category generates. Consequently, the IWU figures for active duty soldiers and their dependents at bases with a

large elderly patient census may be inflated. A similar problem exist for the other component of MWUs, AWUs. The AWUs for a post were allocated to each beneficiary subgroup based on population proportions. Thus, if a subgroup comprises 25% of a catchment area population, it was credited with 25% of the AWUs generated by each clinical service. This may or may not accurately reflect the actual number of AWUs generated by a particular beneficiary subgroup. The reason for this assignment methodology is the inability of centralized military medical information systems to identify service visits by beneficiary category.

An area this study did not address was the unmet medical needs of the non-active duty portion of the beneficiary population. This study only examined the patient care being rendered in Army hospitals. Unfortunately, workload is usually much greater than the work output at Army MTFs. Thus, some beneficiaries must seek care from civilian sources or go without care. This unmet demand varies from post to post and between subgroups of the non-active duty population (e.g., dependents of active duty soldiers versus retirees).

Another area not addressed in the HSC study is that of personnel mix. The models developed in the study are only useful in determining the total number of FTEs a facility should have to meet beneficiary demand consistent with the level of demand that is currently being met. The models do not attempt to determine how many personnel should be physicians, nurses, psychologists, etc. If a hospital is to meet the needs of its beneficiaries, it must know the types of professionals it needs to serve those beneficiaries. Thus, not only does a facility need to know how many physicians it needs, but it also needs to know the distribution of physicians by specialty.

Numerous approaches have been taken to determine the appropriate number and mixture of physicians necessary to serve the medical needs of a population (Weiner et al., 1987). However, each approach has limitations and no one approach is agreed upon by health care policy experts as the best method (Schitovsky and McCall, 1976).

One method to determine physician to population ratios is to look at an area that has its medical needs met by the provider community and to set that provider to population ratio as a desired ratio (Klarman, 1969).

One problem with this technique is the difference in demographics from one geographic area to another. For example, the percentage of the population over 65 years of age in many Florida cities is much higher than it is in other U.S. cities. Because the elderly typically require more care than other segments of the population, an elderly population may not be well served by a provider to population ratio that provides adequate access to a younger population (Hemenway, 1982).

Another method for determining a physician to population ratio is to have a group of experts familiar with the medical needs of a population determine the number of providers needed to serve that population (Graduate Medical Education National Advisory Committee [GMENAC], 1980). Mulhausen & McGee (1989) found that the experts used to establish these projections are usually providers who overestimate the requirement for their services. Nevertheless, this technique is preferable to a demand-based approach (Schwartz & Mendleson, 1990).

A demand-based approach follows free market economic theory and assumes demand will determine supply. In free market economic theory, suppliers

cannot influence demand, consumers are knowledgeable of the product they are purchasing, and the consumer decides the marginal utility of purchasing an extra unit of product. None of these conditions are necessarily present in the medical marketplace (Tarlov, 1990). A physician often strongly influences the type and amount of care a patient receives because of the patient's limited medical knowledge.

Regardless of the methods used to determine physician staffing ratios in the private sector, the applicability of these ratios to the Army is limited. The demographics of the Army beneficiary population is different than civilian populations, a priority of care exist for serving different subgroups of the Army beneficiary population, and the mission of the military medical system is considerably different than that of civilian healthcare. In addition, the demand generated by one large group of beneficiaries, retirees and their dependents, can vary from facility to facility. If retirees in an area are employed by employers who offer health insurance at a low cost, the retirees may place their demand at civilian institutions. However, retirees who do not have civilian health insurance and retirees who are over 65 years of age find the military

medical system to be their least-cost alternative for health care.

Because of the uniqueness of the military medical system, James and Williams (1990) examined the suggested physician staffing ratios from numerous civilian studies and many military staffing studies in an attempt to derive staffing ratios for military beneficiary populations. After an extensive review of the civilian and military literature and a thorough examination of the military healthcare system, James and Williams derived a physician to beneficiary population staffing ratio for each medical specialty in the Army. These ratios were reviewed by the consultant of each medical specialty and adjustments were made in the staffing ratios when justifiable.

James and Williams applied the agreed upon ratios to the catchment area population of each of 31 continental U.S. (CONUS) Medical Department Activities (MEDDACs) to determine a theoretical staffing level for each medical specialty at each of 31 MEDDACs. The staffing mix for each MEDDAC was then forwarded to the MEDDAC commander for comments and recommended changes. Using the replies of MEDDAC commanders, a regression analysis was conducted to determine the amount of

agreement between the staffing levels determined by James and Williams and the staffing levels desired by the MEDDAC commanders. An R^2 of .94 was obtained in this analysis, indicating that, on average, the staffing levels for a MEDDAC determined by the physician to beneficiary population ratios are very good estimates of the actual need of a medical activity as determined by its commander. However, this high correlation may have been obtained because suggested staffing levels for most specialties at most facilities exceeded actual facilities staffing levels.

The findings of this study and the high accountability for variance among staffing levels found in the HSC study (Braun, 1991) have led Army Medical Department resource managers to use the tools developed in these studies for making manpower staffing decisions. For example, the physician staffing ratios developed by James and Williams were used in making assignment decisions at the 1991 Medical Corps Physician Distribution Conference (D. Braendel, personnel communication, May, 1991) and the FTE models HSC developed will be used in determining FTE changes at CONUS MEDDACs which will experience a change in their beneficiary population due to base realignments

(W. Braun, personal communication, May, 1991). In this latter case, HSC will identify categories of employees in which personnel reductions will occur and the number of reductions (e.g., x officers, y enlisted soldiers, and z civilians). However, each MEDDAC commander will decide which specialties within an employee category will be reduced.

Given the number of physician specialties found in any hospital, such a decision will not be easy. A commander could use the suggested staffing ratios from the Medical Corps Optimization Study (James and Williams, 1990) in making his reduction decisions. However, these ratios were not developed with the intent that they would be directly applied to every catchment area without some adjustment. James and Williams cautioned in their study that "the ratios were determined based on the aggregate population [Army beneficiary], the requirements they generate must be refined by facility" (p. 17). These ratios must be viewed as a guide and must be validated or adjusted after a thorough analysis of the catchment area population and its medical demands. Without such a validation, reductions in manpower could be made that would: 1) not best serve the medical needs of a

specific community, 2) result in an underutilization of manpower and facilities, and 3) increase the per capita amount of money spent on medical care obtained outside the military care system.

PURPOSE OF CURRENT STUDY

Fort Polk, Louisiana is one of the many Army posts that will experience a substantial change in its beneficiary population due to Congressionally mandated force reductions. The purpose of this study was to determine the medical specialty mix at Bayne-Jones Army Community Hospital, Fort Polk that will best serve the needs of the new catchment area beneficiary population.

METHODS AND PROCEDURES

The determination of the physician specialty mix that will best meet the needs of the new beneficiary population at Fort Polk was accomplished in two phases.

Phase I: Application of the Optimization Study Ratios

In Phase 1, the number of physicians in each specialty necessary to serve the post-alignment beneficiary population in the Fort Polk catchment area was calculated using the results of the Medical Corps Optimization Study (James & Williams, 1990). Obtaining this physicians mix was a three step process.

Step 1. Change in Active Duty Population

The change in the active duty troop population was determined from figures provided by the Fort Polk Base Realignment And Closure (BRAC) office. These figures included troop population changes due to the movement of Modified Table of Organization and Equipment (MTO&E) units and Tables of Distribution and Allowances (TDA) units to Fort Polk, the movement of MTO&E units from Fort Polk, and the overall downsizing of the Army. Because changes due to BRAC began in December, 1991, the "current" population was established as that which existed on 1 December 1991. All realignment moves are presently expected to end in February, 1994. Thus, the population following realignment was taken as the projected active duty population on 27 February 1994.

Step 2. Change in Non-Active Duty Population

In this step, the new dependent of active duty population in the Fort Polk catchment area following realignment was calculated. To determine this population, the number of family members associated with units leaving Fort Polk was subtracted from the current family member population and the dependents associated with incoming units was added to the remaining population. To obtain the number of

departing family members, the average number of family members per soldier at Fort Polk was multiplied by the number of departing soldiers. The average number of family members per Fort Polk soldier was obtained from the Defense Eligibility Enrollment System (DEERS), a system that assigns family members to the catchment area in which they live. To obtain the number of dependents associated with incoming units, the number of family members associated with TDA soldiers and MTO&E soldiers, as derived by Braun (1990, 1991), were multiplied by the number of incoming TDA and MTO&E soldiers.

In population surveys of several Army posts, Braun (1990, 1991) found that the average number of family members per soldier at Army posts comprised mostly of TDA units is greater than the average number of family members per soldier at posts comprised mostly of MTO&E soldiers. This difference is to be expected given that MTO&E units are comprised largely of young, single soldiers and TDA units are typically comprised of older, married soldiers. In his 1990 survey, Braun found the average MTO&E soldier to have 1.438 family members and the average TDA soldier to have 2.290 family members. In his 1991 survey, Braun found the

average number of family members for MTO&E and TDA to be 1.427 and 2.003, respectively.

The number of family members per MTO&E soldier is consistent between these two surveys; however the number of family members per TDA soldier is not consistent. The difference between the 1990 and 1991 TDA figures may be due to differences in sampling between the two surveys. Because the 1990 estimates involved a larger sample of posts and they did not involve as many permanent party soldiers who were in a training status, the 1990 family member figures for TDA soldiers was used in the present study to estimate the family member population at Fort Polk following realignment.

The other segment of the beneficiary population of interest in this study is the population of retirees, retiree dependents, survivors and others eligible for care in the Fort Polk catchment area. The 1994 population of this group, hereafter referred to as "others," will be determined by modeling programs from the Defense Medical Information System (DMIS) that use the DEERS data.

Step 3. Calculation of Physician Needs

Given the new active duty population figures, the projected family member population and the number of other beneficiaries in the catchment area following post downsizing, the theoretical physician specialty mix needed to support the new beneficiary population was determined in Step 3 using the staffing ratios developed in the Medical Corps Optimization Study (James & Williams, 1990). Because of the priority of care system in the Army, four specialty mixes were calculated. These are:

1. the mix necessary to meet the needs of the active duty population,

2. the mix necessary to meet the needs of the active duty family members,

3. the mix necessary to meet the needs of 'others,' and

4. the mix needed to meet the needs of all beneficiaries (a sum of the first three mixes).

Phase 2: Tailoring of Physician Mix to Fort Polk

Initial Adjustments

The physician to population ratios developed by James and Williams do not take into account the peculiarities of a specific catchment area. For

example, the demographics of an area (e.g., a high retiree population) or the environmental conditions of an area (e.g., high pollen counts) may require that the suggested ratios be adjusted. In this phase of the study, several factors are considered in succession to adjust the staffing mix determined in Phase 1.

Unsupportable Specialties

The specialties identified from the application of the Medical Corps Optimization Study ratios were examined in light of current personnel and equipment assets at Bayne-Jones to determine if any specialty could not be supported without major personnel and/or equipment changes.

Projected Beneficiary Demand

To project beneficiary demand in fiscal year 1994 (FY94), beneficiary outpatient visits to military clinics and to CHAMPUS providers in 1990 were examined. Fiscal year 1990 data was used as opposed to fiscal year 1991 data due to the lack of consistency in the 1991 data. Operation Desert Shield and Operation Desert Storm caused many fluctuations in the 1991 data. This was not a local phenomena. Health Services

Command found the data from FY91 to be so irregular that budget projections for FY92 were made based on FY90 data.

Direct care demand. Obtaining specialty demand by beneficiary category for MTF care was easily obtained from monthly MED 302 reports. These reports summarize visits on a monthly basis to each hospital clinic (e.g. orthopedics, cast, social work, etc.) and to clinics in outlying facilities such as the troop medical clinics. Within each clinic, visits are summarized by beneficiary category (e.g., active duty Army, dependent of Navy retiree, Army retiree, etc.).

CHAMPUS demand. Specialty visits by beneficiary category are not reported directly by CHAMPUS. An attempt was made to obtain specialty data by asking CHAMPUS to provide a report of claims by provider (given the name of a provider, we could look up his speciality as published by the AMA), but such a report was not available. Thus, specialty demand by beneficiary category had to be obtained indirectly.

Specialty demand by beneficiary category was derived by combining the information provided in two standard CHAMPUS reports, the FY90 Provider Participation Report and the 1990 Cost and Workload

Report. The Provider Participation Report provided a summary, by specialty (e.g., orthopedics, ophthalmology, general/family practice, etc.), of paid CHAMPUS claims submitted by physicians in Louisiana who had participated in CHAMPUS at least once during the year. Twenty thousand claims from the Fort Polk catchment area and the two metropolitan areas located on the outside edge of the catchment area (Alexandria, LA and Lake Charles, LA) were extracted from this report. (Note: Approximately 44,000 CHAMPUS claims were paid in FY90 for beneficiaries living in the catchment area.) The proportion of extracted claims submitted by each specialty was applied to the number of CHAMPUS outpatient claims for FY90 to determine total demand for care by each specialty. (E.g., If 5% of the claims from participating providers were submitted by ophthalmologists, then 5% of the 44,000 claims were assumed to have been submitted by ophthalmologists.)

Having proportioned FY90 CHAMPUS visits by specialty, the visits were then subproportioned by beneficiary category using the 1990 CHAMPUS Cost and Workload Report. This report summarized over 40,000 catchment area visits by beneficiary category and

general area of medicine (e.g., of 40,000 visits, 15,000 were to surgery specialists, and active duty family members accounted for 10,000 of these 15,000 surgery visits). From this report, the proportion of visits by each beneficiary category to psychiatric, medicine and surgery physicians was obtained. These proportions were then applied to the specialty data obtained from the Provider Participation Report to obtain specialty visits by beneficiary category. To clarify this procedure for determining CHAMPUS visits to specialists by beneficiary category, the following example is provided.

From the Provider Participation Report, one may have determined that ophthalmologists submitted 5% of all FY90 claims. If 40,000 claims were submitted, than the demand for ophthalmology was 2,000 visits (40,000 x .05). If the Cost and Workload report indicated that 75% of all surgery visits were consumed by active duty family members, then we could estimate that the active duty family member demand for ophthalmology, a surgery specialty, was 2,000 x .75, or 1,500 visits.

1994 demand. The CHAMPUS data was combined with the MTF data to yield total FY90 demand by each of the three beneficiary categories of interest (active duty,

family member of active duty, and "other") for each specialty. To obtain the projected number of 1994 visits to each specialty by active duty soldiers and their family members, the FY90 demand was reduced by the same percentage that the size of each of these two populations will be reduced between December 1991 and February 1994. Due to the stability of the size of the "other" population, their demand was projected to be the same in 1994 as it was in 1990.

Given the 1994 visit demand, the number of providers needed to meet this demand was determined by using a variety of models. Unfortunately, not all models were applicable to all specialties. Each of the models in discussed below.

James and Williams Productivity Model. In the Medical Corps Optimization Study, James and Williams (1990) suggested weekly productivity figures for each specialty in the Army Medical Corps based on the median productivity of civilian specialists. Median productivity figures were obtained from Physician Marketplace Statistics (1989), an annual publication of the American Medical Association (AMA). Statistics in this report are based on a survey in which specialists are asked how many patient visits they had in their

most recent full week of practice. These were the figures James and Williams presented to the Army specialty consultants for adjustment to obtain Army productivity figures that reflect the unique requirements of military medicine. An annual productivity figure was derived from each of these weekly adjusted figures for each specialty by multiplying the adjusted weekly productivity figure by 46, the number of weeks James and Williams estimated an Army physician is available to treat patients (four weeks of annual leave a year and two weeks of continuing medical education per year were assumed). To obtain the number of desired physicians in a speciality in the present study, the number of projected specialty visits in 1994 was divided by the yearly productivity figure for that specialty.

American Medical Association Model. The 1990 edition of Physician Marketplace Statistics (AMA, 1990) was used to create a model for the present study. The productivity figure used for the model in the present study was the average number of weekly patient visits to a physician's office. This figure was multiplied by 46 to obtain the yearly number of office visits a specialist could be expected to produce. A work year

of 46 weeks was used so that this model would be consistent with the James and Williams' model.

Two differences between the AMA model developed for this study and the James and Williams model described above are the dates of the AMA data used (James and Williams used spring, 1989 data, the current study used spring, 1990 data) and the numbers used for weekly productivity. As mentioned earlier, James and Williams presented weekly productivity figures to Army specialty consultants for review. However, it appears that the productivity figures presented to the consultants were the total number of visits a physician performed per week. This included outpatient, emergency room, nursing home and inpatient visits. Because the current study used ambulatory visit data for the basis of projecting future demand and because Army physicians are not usually credited for visits other than ambulatory visits performed in their regular clinic location, only the number of visits a civilian physician performs in his office each week were used in the AMA model.

European Model. This model is based on a 1990 study by Travis of Army providers in Europe. In this model, the average number of provider visits per year

were derived by examining the annual productivity of six types of Army providers in Europe: physician assistants, general medical officers (now designated field surgeons), family practitioners, pediatricians, internists and obstetricians/gynecologists. The purpose of the study was to determine the number of medical personnel that should be assigned to an area g'ven the number of beneficiaries in the area and the known visit rate of beneficiaries in Europe. The yearly productivity figures in this model were based on an average work month of 15 days (2.5 days leave/month, 1 day equivalent/month in meetings, 2.5 days/month for nonpatient care activities). This equates to a 36 week work year ((15 days/month x 12 months) / 5 days/week).

Bayne-Jones Model. This model is based on current provider productivity rates at Bayne-Jones Army Community Hospital. Provider productivity for the first six months of FY92 was obtained from the Appointment Scheduling Module of the hospital computer system and projected for one full year. The productivity of department heads and civilian providers was not included in this model due to the administrative duties which reduce clinical productivity.

Tri-Service Staffing Models. Since the release of the Jones and Williams study, tri-service staffing models for several specialties have been developed by the Joint Healthcare Management Engineering Team. These models derive provider needs based on a variety of inputs. The inputs to these models depend on the provider specialty being examined. Some common inputs include clinic visits, bed days, number of dispositions, and surgical procedures. All figures input into these models were based on 1994 demand given the volume of visits in 1990 and reductions in beneficiary populations.

Further Adjustments to Physician Mix

The models reviewed above were used to adjust the provider figures obtained from the application of the Medical Corps Optimization Study physician to population ratios. The expected number of physicians needed to support the total beneficiary population was more than the number of military physicians currently assigned to Bayne-Jones. Consequently, a method for determining what specialties should be kept and the size of the physician staff for each specialty was developed and applied to the adjusted provider figures. Considerations in this methodology were: operational

needs, priority of care, ability to coordinate patient care under the Gateway to Care program, availability of civilian providers in the catchment area, and cost of care in the civilian community.

Operational Needs

The Army requires that a medical activity have two operational medicine positions: the commander and the deputy commander for clinical services. Consequently, a need for two operational medicine physicians will be established.

Active Duty Needs

The first priority of care for military medical treatment facilities is the active duty troop population. Thus, the full time equivalents in each specialty need to support the active duty population were determined by taking the adjusted needs in each specialty and rounding to the nearest whole number of physicians. If less than .5 of a full time equivalent for a specialty was needed, the specialty was not considered as needed.

Ability to Coordinate Care

A major shift in the delivery of health care services in Army treatment facilities will take place with the introduction of the Army managed care program,

Gateway to Care. An essential element of this program is the empanelment of beneficiaries with primary care physicians who serve as medical service gatekeepers. These gatekeepers will coordinate the care of all patients on their panel to help assure that beneficiaries receive appropriate care from appropriate sources. Without these gatekeepers, coordinated care will not succeed.

Ideally, the Army would like all beneficiaries to participate in the Gateway to Care Program to minimize annual health care expenses. In rural areas such as Fort Polk where sources of health care other than the military are limited, a majority of the beneficiary population can be expected to desire enrollment in Gateway to Care. To assure the capability of enrolling beneficiaries desiring participation and to reduce medical expenditures, the number of primary care providers necessary to care for 100% of the beneficiary population currently using Bayne-Jones should be available to the hospital. Thus, this number of primary care providers will be designated as necessary staff and will be added to the providers needed to care for the active duty population.

Availability of Civilian Providers

As mentioned earlier, the number of physicians needed to meet the medical needs of the catchment area population will be in excess of the number of physicians Bayne-Jones can expect to have assigned. Thus, before deciding on what other physicians (other than primary care) should be added to the staff at Bayne-Jones Army Community Hospital, the availability of civilian providers needs to be examined to determine the type and the number of specialists that are available in the catchment area in excess of civilian need. Excess availability is defined, for the purposes of this study, as a ratio of physician to catchment area population that is higher than the average physician to population ratio in the United States for any given specialty. If an excess number of physicians exist in a given specialty, this specialty should not be considered for addition to the staff at Bayne-Jones until all specialties for which an excess does not exist have been added to the staff.

Costs

The cost of services attributable to each specialty varies, with some specialties costing much more than others. To minimize Department of Defense

medical expenditures, cost should be used to prioritize the military specialists on staff. (This assumes that military facilities can provide care for less than civilian facilities.)

To determine which physicians should be added to the Bayne-Jones staff to meet the needs of the active duty family member and "others" populations, specialties were rank ordered by the total expense associated with the average provider in the specialty. To obtain the total expense per specialist, the average annual gross income of a physician in the specialty was added to the total inpatient cost associated with the specialty. To obtain gross income, specialty net incomes as reported by the AMA (1990) were converted to gross incomes by using the average physician's overhead expense of 41% of gross earnings (Medical Economics, 1991). Gross income was desired because billed charges reflect gross income, not net income. Annual inpatient costs associated with each speciality were obtained by multiplying the average number of admissions per year per specialist (AMA, 1990) by the average cost of a FY89 CHAMPUS admission for that specialty.

RESULTS

Phase 1: Application of Optimization Study Ratios

Step 1. Change in Active Duty Population

A summary of the change in troop population at Fort Polk is provided in Table 1.

Table 1

Summary of Active Duty Troop Population Changes

		Gains	Losses
Population loss (1 DEC 91-27 FEB 94)			(12,259)
Population of incoming TDA units		1,052	
Population of incoming MTO&E units		6,933	
Net Change in troop population			(4,274)
Current Population (1 DEC 91)	15,345		
Minus loss in troop population	4,274		
New troop strength	11,071		

Step 2. Change in non-Active Duty Population

The results of the application of the DMIS and Braun (1990, 1991) family member to soldier ratios to the 1994 active duty population at Fort Polk are presented in Table 2.

Table 2

Change in Family Member Population	
Departing active duty population	(12,259)
Family members/soldier	1.35
Loss of family members	(16,550)
Population of incoming TDA units	1,052
Family members/TDA soldier	2.29
Incoming TDA family members	2,409
Population of incoming MTO&E units	6,933
Family members/MTO&E soldier	1.43
Incoming MTO&E family members	9,914
Net population loss (2,409+9,914+(-16,550)=	(4,226)
Current family member population	20,716
Minus net population loss:	(4,226)
Post-realignment family member population	16,489

The Defense Medical Information System (DMIS) was used to determine the 'others' population in 1994. Using the number of 'others' enrolled in DEERS on 30 September 1989 (6,355) as a baseline, the growth rate of retirees, and the migration patterns of

retirees, the Resource Analysis and Planning System of DMIS estimates that this population will grow by an average of 57 per year, reaching 6,638 beneficiaries in 1994. However, from 1989 to 1990, the number of "other" DEERS enrollees living in the Fort Polk catchment area dropped by 144, from 6,355 to 6,211 enrollees. Given the projected growth in this population, the recent unexpected population decline, the remote rural location of Fort Polk, and the poor economic conditions of the catchment area, a substantial change in the "other" population from its 1989 level is not foreseeable. Consequently, the 30 September 1989 "other" population figure of 6,355 was assumed to be the "other" population in 1994. Consequently, 1994 demand from this population was assumed to be equivalent to its demand in FY90.

Step 3. Calculation of Physician Needs

The results of the application of the Medical Corps Optimization Study physician to population ratios are presented in Table 3. Four specialty mixes are provided: one for each of the three population segments of interest and one for all three segments combined. Only those specialties with a projected need of one or more physicians to meet the needs of all beneficiary

groups are listed. The total number of physicians determined necessary to treat all beneficiaries far exceeds the number of military physicians currently assigned to Bayne-Jones Army Community Hospital.

Table 3

Physician Needs Derived from Optimization Study Ratios

Specialty	Active Duty	Family Member	Others	Total
Operational Medicine	2.05			2.05
Preventive Medicine[1]	1.00			1.00
Cardiology	.41	.61	.24	1.26
Obstetrics/Gynecology	.44	1.89	1.96	4.29
Urology	.46	.68	.27	1.41
Anesthesia	.91	1.35	.53	2.79
Pediatrics		3.20	.44	3.65
Ophthalmology	.66	.98	.39	2.03
Otolaryngology	.35	.52	.21	1.07
Psychiatry	1.32	1.96	.77	4.06
Child Psychiatry		1.14	.27	1.41
Neurology	.54	.81	.32	1.67
Internal Medicine	1.79	2.66	1.05	5.49
Family Practice	3.95	5.89	2.32	12.17
General Surgery	.75	1.11	.44	2.30
Orthopedics	.76	1.13	.45	2.33
Flight Surgery	1.51			1.51
Diagnostic Radiology	.77	1.15	.45	2.38
Pathology	.58	.87	.34	1.79
Emergency Medicine	1.24	1.85	.73	3.83
Field Surgery	3.13			3.13
Total	22.64	27.80	11.18	61.64

[1]Does not include need for civilian work force.

Phase II: Tailoring of Physician Mix

Unsupportable Specialties

Only one specialty in Table 3, cardiology, was found to be unsupportable. Bayne-Jones does not have a cardiac catheterization laboratory nor does it have the surgery subspecialties that a facility should have readily available when performing invasive cardiac procedures. Thus, this specialty will no longer be considered for staffing at Bayne-Jones.

Projected Beneficiary Demand

Table 4 provides a summary of provider needs in 1994 based on the Medical Corps Optimization Study ratios and the five other models employed in this study. Not all specialties listed in Table 3 are shown in Table 4 because the models employed were not applicable to all specialties listed in Table 3. One specialty, dermatology, appears in Table 4 but was not listed in Table 3 because models other than the Medical Corps Optimization Study model justify a full time equivalent in this specialty.

Table 4

Comparison of Six Physician Need Models

Specialty	Model: Optimization Study	James & Williams	AMA	BJACH	Europe	JHMET
Ob/Gyn	4.3	3.8	4.6	5.5	5.9	11
Urology	1.4	0.5				
Anesthesiology		2.8				2[1]
Pediatrics	3.7	2.5	3.2	6.9	4.5	
Opthalmology	2.0	0.9	1.0	2.2		
Otolarngology	1.1	0.6	0.6	1.1		
Neurology	1.7	0.1				
Psychiatry	5.5[2]	1.8	2.4	2.4		18[3]
Medicine	5.5	4.4	4.7	7.2	5.6	
Family Practice	12.2	10.1	14.1	21.7	15.0	13[4]
General Surgery	2.3	1.6	3.4	3.9		4
Orthopedics	2.3	1.3	1.8	2.8		5
Flight Surgery	1.5	1.7				4
Emergency Med	3.8	5.8	5.5		4.5	6
Field Surgery	3.2	6.2	8.7		9.3	7[5]
Dermatology	0.6	1.9		1.3		

[1]Two anesthesiologists and 3 nurse anesthetists
[2]One is a child psychiatrist
[3]Includes psychologists, social workers and nurses
[4]JHMET primary care model projection
[5]JHMET primary care model applied to troop medical clinic visits

The results of an examination of the Table 4 projections are given below and the resulting adjusted physician need for each specialty is provided.

Obstetrics and Gynecology

The estimates of the various models are similar for obstetrics and gynecology with the exception of the JHMET projection. The JHMET projection of physician need may be high because the JHMET model does not appear to consider the availability of family practice physicians and their ability to care for most obstetrical patients. Need as projected by the other models ranges from four to six physicians. The median of these model projections, five physicians, will be used as the need in 1994.

Urology

Urology is a specialty that has not been regularly available at Bayne-Jones. In addition, only one urologist has been available in the catchment area. The amount of unmet demand in this area may have been very high and thus, projections based on past demand may underestimate actual need. The best estimate to use for this specialty is one physician as projected by the Medical Corps Optimization Study.

Anesthesia

Both studies which model the need for anesthesiologists considered the availability of Certified Registered Nurse Anesthetists (CRNAs). The

JHMET model suggested two anesthesiologists and three CRNAs. Current staffing in anesthesiology consist of one anesthesiologist and four CRNAs. Because of the lack of a second anesthesiologist, patients must sometimes be sent out-of-house for surgery when the one anesthesiologist is not available. Ideally, two anesthesiologists should be assigned to Bayne-Jones.

Pediatrics

The projections for this specialty vary from less than three to nearly seven. Due to optimistic estimates of provider availability (see family practice results below), a need of five pediatricians will be established.

Ophthalmology

Although Bayne-Jones has had an ophthalmology service in the past, only one ophthalmologist has typically been assigned to the hospital. In addition to the limited amount of ophthalmology service available at Bayne-Jones, only one civilian ophthalmologist practices in the catchment area. Consequently, past demand may not actually reflect need. Thus, the projection of the Medical Corps Optimization Study, two ophthalmologists, will be accepted as the actual need.

Otolaryngology

Two models project a need for approximately one-half of a full time equivalent while two models project a need for a full time otolaryngologist. The two models which predict a need for half of a full time equivalent are based on civilian productivity estimates which do not account for the uniqueness of practicing otolaryngology in the Army. Due to the availability of family practitioners and audiologists who can care for some of the less complicated cases a civilian otolaryngologist may see (thus increasing the case mix level of the Army otolaryngologist), the two models based strictly on civilian productivity most likely underestimate the otolaryngology need. Thus, a need for one otolaryngologist is established.

Neurology

A neurologist has not been available in the past at Bayne-Jones and no neurologists practice in the catchment area. Consequently, figures based on past demand may grossly underestimate the need for this specialty. Although the optimization study estimates a need close to two neurologists, one would most likely be adequate.

Psychiatry

Because much of the psychiatric care provided to dependents is in an inpatient setting, the use of outpatient visit data may have underestimated the need for psychiatrists. CHAMPUS data from 1990 shows that for every two outpatient visits, one inpatient visit was rendered. Thus, the Medical Corps Optimization Study recommended number of psychiatrists, five (4 adult, 1 child), is probably the most accurate figure to use. The extremely high number of professionals recommended by the JHMET model is due its inclusion of other mental health professionals in its need estimation. The JHMET model includes psychologists, social workers, and nurses in its count of mental health professionals.

Internal Medicine

The projected need for internists is fairly constant across the models. One reason for this may be the relative availability of internists in the catchment area (five) and a strength of three to four internists at Bayne-Jones. From the data in Table 4, a conservative estimate of the needed number of internists at Bayne-Jones is five.

Family Practice

The projected numbers of needed family practice physicians varies considerably between models. One factor that may be responsible for this variability is the difference in estimates of provider availability from model to model. The Medical Corps Optimization Study, the James and Williams model, and the AMA model all assume that Army physicians are available 46 weeks per year. However, the availability of military physicians may be substantially lower.

The 46 week work year is based on the assumption that a physician takes 4 weeks of leave each year and is not available for two weeks per year due to continuing medical education. Not taken into account in these models are official holidays (10 per year), training holidays (approximately 4 per year), readiness training (approximately 3 days per year), sick leave, in and out processing time and permissive tdy/house hunting time amortized over the tour of a physician (approximately 6 days per year), extended temporary duty (e.g., officer advanced course and flight surgeons training), and days that physicians do not have a full schedule of appointments due to no shows, cancelled appointments, unfilled appointments during the

holidays, unit activities, etc. In addition, one family practitioner at Bayne-Jones pulls in-house call every night and is not scheduled for clinic visits the following day. The European model took many of these factors into account and estimated annual physician availability for clinical duties to be 36 weeks. If the above considerations were taken into account in the other models, then their projections of physician need would be higher.

To estimate the effect of a shorter work year on these other models, the projected need for family practice physicians in 1994 at Bayne-Jones was recalculated using the AMA model and a 42 week work year. This resulted in a projected need of 15 physicians. A 40 week work year resulted in a need for 16 physicians. However, even these estimates may be conservative.

Implicit in the AMA model (and apparently assumed in the James and Williams model and the Medical Corps Optimization Study since they used AMA data to generate their estimates) is a level of nonphysician personnel support per provider that is not available in the military. The AMA model was based on the productivity of civilian physicians who had an average of four

support personnel per physician: two medically trained personnel and two administrative personnel.

Another factor that does not appear to have been considered in the Optimization Study and the AMA models is the difference in case mix between family practice and general practice physicians. The AMA groups these two types of physicians together when providing productivity data, and the productivity data of the Medical Corps Optimization Study indicates that both types of physicians work the same amount of time each week and see the same number of patients. Due to the three years of residency training family practitioners have in areas such as pediatrics, obstetrics and surgery, a family practitioner can and does handle a higher case mix than a general practitioner or a field surgeon. Consequently, productivity (number of patients seen per week) of family practitioners should be lower than that of field surgeons. The fewer the number of patients a physician can see per week, the greater the number of physicians needed. However, because of the wide range of care a family practitioner can deliver, the need for other specialists, like obstetrician/gynecologists, is reduced (see obstetrician/gynecology discussion above).

Also increasing the need in this specialty is the demand for service and department chiefs with a family practice background. In addition to a family practitioner being chief of the family practice department or service, family practitioners are often used in other medical leadership roles such as Chief, Department of Primary Care and Community Medicine. These personnel have a myriad of administrative responsibilities which greatly reduce the amount of time they can devote to patient care.

A new factor that will soon impact on family practitioner productivity in the Army is the institution of Gateway to Care. The requirement for family practice physicians to oversee the care patients obtain from other specialists will reduce the amount of time spent in direct patient care.

Obviously, making a projection of the number of family practice physicians that will be needed at Fort Polk following realignment is not easy. However, due to the apparent overestimation of physician availability by many models, the need for family practitioners in leadership roles, and the new demands

that will be placed on this specialty under Gateway to Care, they need for family practitioners will be placed at 18.

General Surgery

The range of need for these specialists varies among the models from two to four. If surgical demand alone was examined, two general surgeons may be sufficient to meet the needs of the 1994 Fort Polk catchment area population. However, general surgeons at Bayne-Jones have acted as surrogate specialists in areas other than general surgery. For example, much of the work that would typically be referred to a gastroenterologist by our general internists (e.g., scopes of various kinds) is performed by our general surgeons. Another fact that must be considered in determining general surgery staffing is the regularity with which they are called into the emergency room after hours. Running a general surgery service with only two general surgeons who are each on call fifty percent of the time would be very stressful on the assigned surgeons and could affect quality of care. Consequently, a need for three general surgeons will be established.

Orthopedic Surgery

The estimate from JHMET is very high and may not have considered the availability of podiatrists and orthopedic physician assistants. The need for two orthopedic surgeons is fairly consistent across the other models.

Flight Surgery

Two models estimate that Fort Polk will have a need for one to two flight surgeons following realignment while the JHMET model projects a need for four. Due to the limited number of personnel who will be on flight status at Fort Polk following realignment, one full time flight surgeon should be adequate. However, a second trained flight surgeon must be available for when the full time flight surgeon is not available. Training one of the 18 family practice physicians as a flight surgeon should fill this need.

Emergency Medicine

The minimum emergency medicine requirement for staffing an emergency room 24 hours a day, 7 days a week with overlap during peak periods is five emergency medicine physicians. The models provide projections ranging from four to six physicians. Due to the availability of other practitioners at Bayne-Jones who

could work in the emergency room when an emergency medicine physician cannot work a shift, a staffing of five emergency medicine physicians should be adequate.

Field Surgery

Our need for field surgeons is mostly in our Troop Medical Clinics (TMCs). Given the past volume at the TMCs and the estimates of the models which based need on projected 1994 volumes, nine field surgeons are needed. However, this need will be diminished if physician assistants are available to practice at the TMCs. This issue will be addressed later.

Dermatology

This is the one specialty for which the need of a full time equivalent was not projected by the Medical Corps Optimization Study but for which past demand indicates the need for a full time practitioner. Past demand and the James and Williams model indicate a need for nearly two dermatologists. Despite the productivity of the current dermatologist at Fort Polk, which is far above national productivity averages, Bayne-Jones usually has a back log of several hundred patients and often does not put patients on the waiting list because it is so long.

The need for dermatology services at Bayne-Jones is driven by the location of the Fort Polk and the activity of units on post. The climate at Fort Polk is hot and humid for several months each year, a condition that increases the incident rate of fungal infections. When soldiers go to the field in hot and humid conditions where they are unable to shower daily, the incident rate for numerous other dematological conditions also increase. Finally, being in the South, the incidence rate of skin cancer is higher than in other parts of the country. Because of these factors and the past workload in this specialty, a need for two dermatologists will be established.

Revised Projected Needs

The above adjustments to projected physician needs are summarized in Table 5. The needs for each beneficiary group were adjusted by multiplying the physician need for each beneficiary group shown in Table 3 by the corresponding change in total physician need. For example, if the total number of physicians needed in a specialty in Table 3 is four and the revised need is five, than the number of providers

needed to meet the demands of each beneficiary group was increased by 25%. Additional adjustments were made to the family practice and internal medicine figures.

Total family practice need cannot be proportioned among the three beneficiary groups based on group populations because of the availability of field surgeons for active duty needs. To determine the number of family practitioners needed to accommodate the needs of the active duty population in 1994, the number of 1990 family practice visits by soldiers was reduced by the same proportion that active duty troops will be reduced at Fort Polk. The resulting number of projected visits in 1994 is 3,661, an amount that would require no more than 1 family practitioner. The remaining 4.84 family practitioner full time equivalents were divided among the other two populations, dependents of active duty soldiers and "others," in proportion to the number of providers they were estimated to need in Table 3. Thus, 3.48 of the providers originally assigned to active duty need were assigned to family member need and 1.36 of the original active duty need was assigned to the need of "others."

Internal medicine visits were also adjusted similarly to account for the disparity in visit rates

between active duty beneficiaries, their families, and "others." In 1990, 65% of the visits to the internal medicine clinic at Bayne-Jones were by this last group of beneficiaries who only comprised 15% of the total beneficiary population. Thus, dividing the total need for internists by population proportions is not an appropriate methodology for this specialty. To estimate active duty need in 1994, the same methodology used to project 1994 active duty visits to the family practice clinic was used here. This resulted in a projected volume of 1,880 visits, a volume well within the capability of one internist (the average civilian internists has over 3,200 office visits per year). The number of visits by active duty family members to internists in 1994 was also projected by using direct care and CHAMPUS data. The projected number of internal medicine visits in 1994 by this population is expected to be 3,610, an annual volume close to what the average internists can see. The remaining full time equivalents from the active duty and active duty family members (.63 and .42, respectively) were added to the number of physicians projected to be needed by the "others" population in 1994.

Table 5
Adjusted Physician Needs by Specialty

	Beneficiary Needs			
Specialty	Active Duty	Family Member	Others	Total
Operational Medicine	2.00			2.00
Preventive Medicine[1]	1.00			1.00
Ob/Gyn	.51	2.20	2.28	5.00
Urology	.33	.48	.19	1.00
Anesthesia	.65	.97	.38	2.00
Pediatrics		4.38	.60	5.00
Ophthalmology	.65	.97	.38	2.00
Otolaryngology	.32	.48	.19	1.00
Psychiatry	1.30	1.93	.76	4.00
Child Psychiatry		.90	.10	1.00
Neurology	.32	.49	.19	1.00
Internal Medicine[2]	1.00	1.00	3.00	5.00
Family Practice[3]	1.00	12.19	4.79	18.00
General Surgery	.98	1.45	.57	3.00
Orthopedics	.65	.97	.39	2.00
Flight Surgery	1.00			1.00
Diagnostic Radiology	.77	1.15	.45	2.38
Pathology	.58	.87	.34	1.79
Emergency Medicine	1.62	2.41	.97	5.00
Field Surgery	9.00			9.00
Dermatology	.66	1.00	.40	2.06

[1]Does not include civilian employee care
[2]Needs/beneficiary group adjusted with 1990 visit data
[3]Active need adjusted for presence of field surgeons

Further Adjustments

Active Duty Need

The list of specialists needed to support only the active duty population at Fort Polk is presented below. Whole numbers were obtained by rounding up the provider need in Table 5 if the need was $\geq .5$.

Table 6
Physician Needs for Active Duty Population

Specialty	Active Duty
Operational Medicine	1
Preventive Medicine	1
Obstetrics/Gynecology	1
Anesthesia	1
Ophthalmology	1
Psychiatry	1
Internal Medicine	1
Family Practice	1
General Surgery	1
Orthopedics	1
Flight Surgery	1
Diagnostic Radiology	1
Pathology	1
Emergency Medicine	2
Field Surgery	9
Dermatology	1
Total	25

Ability to Coordinate Care

The number of physicians necessary to coordinate the care of all beneficiaries in the Fort Polk catchment area is the sum of family practitioners (18) and field surgeons (9) in Table 5 (27 physicians).

Availability of Civilian Providers

Table 7 presents a list of specialities available in the catchment area, the physician to population ratio for each specialty (population excludes beneficiary population), and the nationwide physician to population ratio for the specialty.

Table 7
Specialties in the Fort Polk Catchment Area

Specialty	Number	Specialty to Population Ratio: Catchment Area	Specialty to Population Ratio: United States[1]
Gen./Family Practice	33	1: 3,953	1: 3,771
Pediatrics	6	1: 21,082	1: 7,101
Internal Medicine	5	1: 25,299	1: 2,959
Obstetrics/Gynecology	3	1: 42,165	1: 7,992
General Surgery	4	1: 31,624	1: 7,049
Orthopedic Surgery	1	1:126,496	1:14,100
Anesthesiology	1	1:126,496	1:10,567
Ophthalmology	1	1:126,496	1:16,473
Urology	1	1:126,496	1:26,654
Radiology	3	1: 42,165	1:32,309
Pathology	1	1:126,496	1:20,490
Total	59		

[1]Source: Robach, Randolph & Seidman (1990)

As can be seen in Table 7, not one of the specialties in the catchment area has a physician to population ratio that is better than its national physician to population ratio. Thus, no excess availability of any specialty exist in the catchment area.

Costs

The average total cost associated with several of the specialties in Table 5 are presented in Table 8. Specialties are rank ordered by total expense in

Table 8. Total expense includes gross salary plus annual inpatient charges associated with each speciality. CHAMPUS data was not available for pediatric admissions, so data from the Universal Healthcare Almanac (Silver & Cherner, 1991) and the National Center for Health Statistics (U.S. Department of Health and Human Services [DHHS], 1991) was used for this specialty. This latter source was also used to obtain psychiatric admission data.

Table 8

Average Cost Associated with Selected Specialties

Specialty	Gross Income[1] (000)	Government Cost Per Disposition[2] (000)	Disp. Per Year	Total Annual Cost (000)
Psychiatry	$169	$15.280	120	$2,003
Orthopedics	381	3.954	282	1,496
Pediatrics	158	4.993	188	1,096
Ob/Gyn	278	1.920	282	819
Urology	353	1.636	235	737
General Surgery	268	1.844	235	691
Otolaryngology	293	1.727	141	537
Internal Medicine	203	3.663	141	517
Neurology[3]	229	5.014	94	472
Anesthesia	307			307
Radiology	305			305
Ophthalmology	285			285
Pathology	251			251
Dermatology[3]	237			237
Emergency Medicine	207			207

[1]1990 salary data from Roback, Randolph & Seidman (1990)
[2]Cost from FY90 CHAMPUS Summaries
[3]Estimate

Final Adjusted Physician Need

Table 9 summarizes the specialists needed to care for each of the three segments of the beneficiary

population. Specialties are rank ordered by cost with the exception of operational medicine, family practice and specialties which support other specialties.

Two operational medicine physicians are needed to fill the positions of commander and deputy commander for clinical services. Because they are required to operate the medical activity, they are listed initially in Table 9. Next, a sufficient number of primary care physicians need to be on staff to coordinate the care of beneficiaries enrolled in Gateway to Care. Consequently, they are listed as the next priority in Table 9. Finally, some specialties have to be added when other specialties are added.

The addition of radiologists, pathologists and anesthesiologists was done on the basis of their need in relation to the other specialists which demand their services. Because radiologists and pathologists support all specialties and two of each are required to meet the needs of the total beneficiary population, a second radiologist and a second pathologist were determined necessary when half of the other physicians required to meet the needs of the total population had been added to the staff. For anesthesiology, a second anesthesiologist was determined needed after the

first one-half of the total number of surgeons necessary to meet the needs of the total beneficiary population had been added to the list.

Hospital staffing should be accomplished by moving down columns. For example, after all active duty needs have been met, one would move to the top of column two and fill staff positions by moving down the column, thus adding 12 family practitioners and three psychiatrists. If after reaching the bottom of column two the hospital could still add physicians to its staff, one would move to the top of column three and add five more family practitioners.

Table 9

Adjusted Physician Needs by Specialty and Cost

	Beneficiary Needs			
Specialty	Active Duty	Family Member	Others	Total
Operational Medicine	2	0	0	2
Family Practice	1[1]	12	5	18
Psychiatry	1	3[2]	1	5
Orthopedics	1	1[3]	< .5	2
Pediatrics	0	4	1	5
Obstetrics/Gynecology	1	2[4]	2	5
Urology	< .5	1	< .5	1
General Surgery	1	1	1	3
Otolaryngology	< .5	1	< .5	1
Internal Medicine	1	1	3	5
Neurology	< .5	1	< .5	1
Anesthesia	1	1	< .5	2
Diagnostic Radiology	1	1	< .5	2
Ophthalmology	1	1	< .5	2
Pathology	1	1	< .5	2
Dermatology	1	1	< .5	2
Emergency Medicine	2	2	1	5
Flight Surgery	1	0	0	1
Field Surgery	9	0	0	9
Preventive Medicine	1	0	0	1
Total	26	34	14	74

[1]Need adjusted for presence of field surgeons
[2]One is a child psychiatrist
[3]Add a second pathologist and a second radiologist
[4]Add second anesthesiologist

DISCUSSION

Projected Population Changes

The population of active duty family members in the catchment area following realignment was obtained by subtracting the number of family members leaving Fort Polk from the current family member population and adding the number of family members associated with units being assigned to Fort Polk. The population figures for dependents at Fort Polk and the dependents associated with incoming MTO&E and TDA units were all obtained from the Defense Eligibility Enrollment System (DEERS). One potential drawback in using the DEERS system as a basis for determining populations is the number of eligible beneficiaries who are not enrolled in DEERS. Although enrollment in DEERS is necessary to obtain medical treatment at a military facility or through the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), some beneficiaries do not enroll in DEERS. This shortcoming was determined not to be of importance in this study because the objective of this study is to determine the physician staffing level necessary to meet the needs of beneficiaries who

seek treatment from military medical facilities or through CHAMPUS. Thus, nonenrolled members are not an issue.

Projected Demand

The specialty mix of physicians needed to meet the medical needs of the 1994 Fort Polk catchment area population as determined by the physicians to population ratios developed in the Medical Corps Optimization Study was validated using projections of 1994 demand based on 1990 demand. One disadvantage of this technique is the lack of differentiation between medical need and medical demand. Beneficiaries may not need a service but may be currently demanding it and receiving it. One can argue that we should not provide services beyond those needed. However, through CHAMPUS, the Army eventually pays for much of the demanded services it cannot provide but others do provide.

Another argument against the use of historical visit data to project future demand is that unmet demand is not accounted for. One could argue that unmet demand at the MTF should show up in CHAMPUS visits, but many beneficiaries will go without care rather than obtain care through CHAMPUS. The reason

for them going without care are many. Some beneficiaries cannot afford the deductibles and cost shares associated with CHAMPUS, some people do not know how to use CHAMPUS and others do not seek civilian care because it is not readily available in rural locations like the Fort Polk catchment area.

Another reason that unmet demand may not show up in CHAMPUS visits, even though care was obtained in the civilian community, is the failure of beneficiaries to submit claims to CHAMPUS. If a beneficiary has only made one or two visits to a civilian provider during a fiscal year, the beneficiary will most likely not have met the annual deductible. Thus, filing a claim with CHAMPUS would not be of any financial benefit.

The disadvantages to using past visit data discussed above have a cancelling effect on one another. While using demand data to project need may overestimate true medical need, the unmet demand not accounted for in visit data will help offset this overestimation. One advantage to using past visit data to project future staffing needs is that future staffing levels will not encourage increased demand due to availability. Furthermore, by including the CHAMPUS data in the projections, past demand, whether

or not it was medically necessary, that turned into a financial liability, will have been accounted for. Hopefully, a managed care environment will be able to reduce unnecessary demand.

Availability of Civilian Providers

This study focused on civilian providers available in the catchment area. Although the catchment area is very rural with no large cities, two large cities are located on the outside edges of the catchment area. Alexandria, Louisiana, a city of approximately 55,000 people, is located 50 miles east of Fort Polk. Lake Charles, Louisiana, a city of approximately 90,000 residents, is located 65 miles south of Fort Polk. Although both cities have many physicians, the physician to population ratio for most specialties in both of these cities is below the national average. An excess physician capacity (as defined in this study) of greater than 10% and for which more than one full time equivalent is needed to serve the entire beneficiary population in the catchment area exist in only three specialties: orthopedic surgery, diagnostic radiology and otolaryngology. The excess capacity in these specialties should be considered when deciding which specialties should be available at Bayne-Jones

Army Community Hospital and the number of physicians that should be assigned in these three specialities.

Cost Per Provider

From Table 8, we see that psychiatry is the most expensive specialty to do without. Past experience supports the data in Table 8. Fiscal year 1990 CHAMPUS inpatient and outpatient data reveals that psychiatric services were by far the largest expense to Bayne-Jones Army Community Hospital, accounting for nearly 50% of all CHAMPUS expenditures. Because of the expense associated with psychiatrists, the first staffing priority for meeting the needs of the active duty family member population should be psychiatrists. As indicated in Table 5, three psychiatrists (two adult and one child) should be added to the staff of one required to meet the needs of active duty soldiers.

Several specialties cannot be added on a cost basis. Pathology, radiology and anesthesiology must be added when justified by other physician staffing. Another specialty that cannot be looked at from strictly a cost viewpoint or a population level is emergency medicine. If a hospital decides to run a 24 hour emergency room, a minimum of five emergency medicine physicians are needed to staff the emergency

room. Depending on the volume of patients seen in the emergency room, the type of patients and the backup coverage available when an emergency medicine physician cannot work a shift, more emergency medicine physicians may be necessary.

Reducing Physician Need

The specialists listed in Table 9 are all physicians. In many areas, the need for physician providers can be reduced by introducing physicians assistants and nurse practitioners into the direct health care system. If these alternate providers are used efficiently, seeing patients for which they are well trained to handle, their visit productivity can equal or exceed that of a physician provider. However, such scheduling efficiency leaves the physician provider with a high acuity level and the requirement to review the charts of these other providers, lowering the volume of patients the physician can see. For this reason, the Medical Corps Optimization Study considered the net effect of adding a physician assistant to be a reduction of one half of a physician full time equivalent.

The need for some of the specialties listed in Table 9 will be reduced by physician assistants and

nurse practitioners already assigned to Fort Polk. Some of these areas at Bayne-Jones which have recently had such providers include anesthesia (four nurse practitioners), pediatrics (one nurse practitioner), orthopedics (one physician assistant), preventive medicine (one physician assistant) and internal medicine (one nurse practitioner). In addition to these assets, the 199th Separate Infantry Brigade (Motorized), which is scheduled to move to Fort Polk, has one physician and six physician assistants assigned to it. If all these personnel move to Fort Polk with the 199th, the need for field surgeons would be reduced by four. However, the number of medical personnel that will move with any unit relocating to Fort Polk is not highly predictable at this time.

Study Limitations

One limitation to this study is the lack of consideration of physicians in the MEDical FIller System (MEDFIS)/PROfessional Filler System (PROFIS) and zero-based need physicians (our go to war needs) assigned to Fort Polk. Some PROFIS/MEDFIS and zero-based need physicians in specialties for which Fort Polk does not have use for full time equivalent could be assigned to Bayne-Jones. Currently, such a

situation does not exist at Fort Polk. However, if such specialists were assigned to Fort Polk, they would be used in their specialty as much as possible. The remainder of their time could be used to fulfill some of the needs that other unassigned specialists would meet. A example of such a situation that existed until recently was the assignment of a colon and rectal surgeon to Fort Polk. In addition to performing colon and rectal surgery, he performed general surgery procedures, many scope procedures that a gastroenterologist would normally perform (Fort Polk is not assigned a gastroenterologist) and was the Chief, Department of Surgery.

Another limitation to this methodology is the prioritizing of care by beneficiary category. Not only does this make the retiree population less than happy with their access to the military treatment facility, but it also limits the patient mix for the physician staff. The Army strongly desires that its physicians be well rounded, having regular exposure to the full range of patients appropriate for a specialty. This patient mix is necessary for board certification in many specialities and enables the Army to use its physicians in a variety of locations. Given a limited

staff, the above methodology would most likely limit the practice of Bayne-Jones physicians to active duty soldiers and their families.

A third limitation to the approach taken in this study is the acceptability of cost as a criteria for ranking specialists. Beneficiary expectations of what specialties should be available may be different than the specialties that would be available if cost is used as the criteria for adding specialists to the staff. For example, beneficiaries may desire and/or expect to have a dermatologist on staff, as opposed to a neurologist, because more beneficiaries may have a need for the services of a dermatologist than a neurologist.

Finally, the changing mission of Fort Polk was not considered in this study. With the realignment of Fort Polk will come a training mission that will involve at least one rotation per month of approximately 3,000 trainees. Some units coming to Fort Polk for training will come with organic medical assets who will provide primary care. However, if a training unit does not have organic medical support, Bayne-Jones may be tasked to provide a primary care

physician. In addition to this use of hospital manpower, hospital resources will be used whenever secondary or tertiary care is required.

CONCLUSION

This study quantifies the need for physician specialties necessary to support the beneficiary population of the Fort Polk catchment area following the realignment of Fort Polk. Specialty need is subdivided among population groups, allowing the commander to determine how many physicians in each specialty are necessary to meet the needs of the active duty population, the active duty family member population, and the population of others entitled to medical care in military treatment facilities. In addition to providing physician need by specialty, this study also identifies which physician specialists should be added to the staff to minimize CHAMPUS expenditures.

Given the need of the beneficiary population and the staffing of the hospital, Bayne-Jones Army Community hospital will be able to determine the specialty areas in which it does not have an adequate staff. Knowing where its shortages are, the hospital will then be able to identify those specialities for

which it should make business arrangements in the civilian sector to minimize its CHAMPUS expenditures. Such information should enhance the effectiveness of managed care at Bayne-Jones.

REFERENCES

American Medical Association (1989). Physician Marketplace Statistics, Fall 1989. Chicago: Author.

American Medical Association (1990). Physician Marketplace Statistics, Fall 1990. Chicago: Author.

Braun, W.W. (1990). Manpower Productivity Model. Memorandum for Medical Center and Medical Activity Commanders, U.S. Army Health Services Command, San Antonio, Texas.

Braun, W. W. (1991). Manpower Productivity Model. Memorandum for Medical Center and Medical Activity Commanders, U.S. Army Health Services Command, San Antonio, Texas.

Graduate Medical Education National Advisory Committee. (1981). Report of the Graduate Medical Education National Advisory Committee to the Secretary, Department of Health and Human Services, Volume I. (DHHS Publication No. HRA 81-651). Washington, DC: U.S. Government Printing Office.

Health Insurance Association of America. (1990). Source Book of Health Insurance Data. Washington, D.C.: Author.

Hemenway, D. (1982). The optimal location of doctors. The New England Journal of Medicine, 306, 397-401.

James, J. & Williams, T. (1990). Medical Corps Optimization Study. Department of the Army, Office of the Surgeon General, Medical Corps Affairs, Falls Church, VA.

Klarman, H. E. (1969). Economic aspects of projecting requirements for projecting requirements for health manpower. Journal of Human Resources, 4, 360-376.

Medical Economics Publishing (1991). The trend in practice spending since 1990. Medical Economics, 68 (21), 132.

Mulhausen, R. & McGee, J. (1989). Physician need: An alternative projection from a study of large, prepaid group practices. Journal of the American Medical Association, 261, 1930-1934.

National Center for Health Statistics. (1991). Health United States 1990 (DHHS Publication No. PHS 91-1232). Hyattsville, Maryland: U.S. Government Printing Office.

Roback, G., Randolph, L. & Seidman, B. (1990). Physician Characteristics and Distribution in the U.S. American Medical Association, Chicago.

Schwartz, W. B. & Mendelson, D. N. (1990). No evidence of an emerging physician surplus. 'Journal of the American Medical Association, 263, 557-560.

Tarlov, A. R. (1990). How many physicians is enough? Journal of the American Medical Association, 263, 571-172.

Scitovsky, A. A. & McCall, N. (1976). A method for estimating physician requirements. Milbank Memorial Fund Quarterly, Summer, 299-320.

Silver & Cherner, Limited. (1990). The Universal Healthcare Almanac. Pheonix, AZ: Author.

Travis, Richard T. (1990). The Medical Community Family Support Study Results. Heidelberg, 7th Medical Command.

U.S. Department of Commerce, Bureau of the Census. (1990). Statistical Abstract of the United States. Washington, D.C.: U.S. Government Printing Office.

Weiner, J. P., Steinwachs, D. M., Shapiro, S., Coltin, K. L., Ershoff, D., & O'Connor, J. P. (1987). Assessing a methodology for physicians requirement forecasting: Replication of GMENAC's need-based model for the pediatric specialty. Medical Care, 25, 426-436.